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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Second Semester, M. Tech - Civil Engineering (MCAD)

Semester End Examination; June - 2016

Analysis of Plates

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Assume missing data if any.

UNIT - I

1 a. Derive the basic differential equation for bending of long rectangular plate into a cylindrical surface under the action of constant lateral loading. 14

b. Clearly explain the assumptions made in the theory of thin plates bringing out their significance. 6

2. Derive an expression for the slope and deflection of a circular plate with circular hole at the centre. 20

UNIT - II

3. A simply supported rectangular plate of constant thickness is subjected to a lateral load of intensity which linearly varies from zero along one edge to a maximum at the opposite edge; there being no variation along the perpendicular direction. Derive an expression using the Navier's method for the deflection surface of the plate under such a loading condition. Also find maximum Deflection. 20

4. Derive the following differential equation for the deflection surface of the laterally loaded rectangular plate with usual notation, 20

$$\frac{\partial^4 w}{\partial x^4} + 2\frac{\partial w^4}{\partial x^2 y^2} + \frac{\partial^4 w}{\partial y^4} = \frac{q}{D}$$

UNIT - III

5. A simply supported rectangular plate (a × 2a) is subjected to a hydrostatic pressure loading with the intensity being zero at $y = 0$ and 'q_0' at y = b. Derive the expression for the deflection. Adopt Levy's method. 20

6. Simply supported rectangular plate is subjected to uniformly distributed load of intensity q_0 per unit area. Obtain the equation for deflection surface and calculate the maximum deflection of a square plate adopt Levi's approach. 20

UNIT - IV

7. Derive an expression for the deflection of a circular plate with clamped edges and loaded with UDL of intensity 'q' over the entire surface. Find the maximum Deflection, radial and circumferential moments. 20

Contd…..2

8. A simply supported rectangular plate (a × 2a) is loaded uniformly. Obtain the solution for large deflection. Obtain same for a square plate. 20

UNIT - V

9. For a simply supported square plate made of isotropic material, determine the deflection and moments at the centre using finite difference method. The plate is of size 6 x 6 m subjected to a pressure of 6 kN/m^2 including its self weight. The thickness of the plate is 120 mm. 20

   Assume E = $2x10^7$ kN/m^2 and μ = 0.15.

10. For a square plate made of isotropic material, determine the deflection and moments at the centre using finite difference method. The plate is of size 5 x 5 m subjected to a pressure of 4.5 kN/m^2 excluding its self weight. The thickness of the plate is 100 mm. 20

    Assume E = $2x10^7$ kN/m^2 and μ = 0.14. All the edges are simply supported.

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